mentaries," to Pedro Sarmiento de Gamboa's diametrically opposed "History of the Incas," to the reliable and unbiased Cieza's writings, and to many other equally valuable works. Nor are Sir Clements's own works to be left unread by any student of the subject. He did more than any other one man for South American anthropology.

Perhaps the most endearing trait of the great scholar's character was his unselfishness. It happened that I ran across a copy of a certain rare book on Peru. Although I did not then know Sir Clements I ventured to write to him and ask him whether it would be worth while to publish an English translation of the work. He replied that it would. Although he himself had already made a translation (still in MS.) he encouraged me to go ahead with mine and he personally made arrangements for its publication in England. Such generosity is of the best sort. It shows that Sir Clements placed the advancement of knowledge above his own advancement, and it shows that he was glad to help even an unknown beginner by a personal sacrifice.

X.

SCIENTIFIC BOOKS

The Horse in Health and Disease. F. B. HADLEY. W. B. Saunders and Co., Philadelphia.

This book, designed as an introductory text to the study of veterinary science in agricultural schools and colleges, ought to fulfill its purpose. The author is to be congratulated upon his judgment in selecting the most suitable material. He has succeeded in bringing together in a condensed form a number of branches of veterinary science.

Although couched in scientific terms, most of which are defined with their first appearance, the book ought to be intelligible to a careful reader. The arrangement is complete, leaving little to be desired. The horse is taken as the type. Beginning with the anatomy and physiology, the structure and function of the normal or healthy animal is explained. This knowledge is indispensable to one expecting to recognize abnormal conditions. Then follows a brief description of a great variety of diseases, together with measures of control.

By way of adverse criticism, very little can be said. In discussing the subject of diagnosis of disease, there occurs: "Even an experienced diagnostician fails to make an absolutely accurate diagnosis in more than 50 per cent. of his cases." This must be very discouraging to a novice and the facts of the case do not render the statement justifiable. To be sure, the word *absolutely* makes the statement invulnerable, but the impression created is detrimental and uncomplimentary to the author's profession. Under retention of the urine occurs the following: "The bladder of the stallion or gelding can be emptied only by use of the catheter." Practitioners frequently evacuate the bladder of males by pressure upon the bladder per rectum, even upon recumbent animals.

The illustrations, most of which are photographs, are clear and numerous. The excellent paper and the clearness of the type are characteristic of the publishers.

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QUOTATIONS

THE CONTROL OF EPIDEMIC INFANTILE PARALYSIS

THE severe epidemic of infantile paralysis—or acute anterior poliomyelitis, to give the disease a more descriptive title—that now prevails in New York has not unnaturally given rise to a certain degree of anxiety in our own country also. During the last two months this epidemic has caused the death of some 1,400 children in New York, the mortality being about 25 per cent.; comparatively few adults have been attacked. Quarantine regulations are now being widely enforced in the neighboring districts, and children under 16 years of age, we read in the *Times,* are forbidden to travel, to the vast inconvenience of holiday-makers. The public health authorities in New York are only too familiar with epidemic infantile paralysis, for the disease is always present and always more or less active in that cosmopolitan town. They are endeavoring to limit the epidemic by the isolation or quaran-

tine of the most susceptible part of the population—that is to say, of the children. No more effectual way of dealing with the situation is known.

The disease is one that has been studied with great success during the last few years in America, more particularly by Flexner and his pupils, to whom we owe many of the recent discoveries made as to its etiology and the way in which it may be communicated from one person to another. The great advances made in this regard during the last five or six years may perhaps be shown by a brief history of the disease. It was first isolated as a distinct entity from the mixed mass of paralyses affecting children by von Heine in 1840, receiving the name "spinal paralysis of children"; naturally there could be no exact knowledge of its pathological anatomy at this early date. Two or three decades later Prévost and Vulpian, Charcot and Joffroy and others described accurately the microscopical lesions that could be found in the spinal cords of patients dying of the disease. In 1890 Medin, taught by the study of a Swedish epidemic of infantile paralysis, extended our knowledge of its various clinical types, particularly in the symptomatology of their initial stages. Further advances were made by Wickman in 1905 and the succeeding years, particularly so far as the epidemiology of the disease is concerned. Many other physicians and pathologists could be mentioned as having cleared up various obscure points in connection with infantile paralysis, or, as it is sometimes termed, Heine-Medin's disease, or the Heine-Medin-Wickman disease; its bacterial cause was looked for with great persistence, and between the years 1898 and 1907 was identified by a number of observers, quite wrongly, with various cocci cultivated from the cerebro-spinal fluid of patients who had or had died of the disease. Fuller experience, however, proved that errors had been made here, and in 1911 Römer summed the matter up correctly when he said that the true bacterial cause of the disease was still unknown. Both cultural experiments and experiments on animals had failed to reveal it. Yet the seasonal and epidemic incidence of infantile paralysis and the inflammatory character of the lesions observed in it *post mortem* made it certain that some living and transmissible virus was the cause of the disease.

So far as its transmissibility was concerned, Landsteiner and Popper have shown that certain apes—hamadryads and macaques—could be infected with a disease indistinguishable from infantile paralysis, as we see it in children, by inoculation with an emulsion of the spinal cord of patients dying of the disease. The virus was found to be a filter-passer, and to survive preservation in glycerine for many months. In 1912 Kling, of Stockholm, succeeded in recovering the virus from washings from the mouth, nose, trachea and small intestine of fatal cases of infantile paralysis. But the actual microbe causing the disease remained unknown until 1913, when it was isolated, grown on artificial media, and carefully described by Flexner and Noguchi. The success of these investigators where so many others had failed is to be attributed to their discovery of a suitable culture medium. Growths were made anærobically under a layer of paraffin, in a solid agar medium containing sterile unfiltered ascitic fluid, or brain extract and sterile rabbit kidney. Minute colonies of the virus were obtained, composed of globular or globoid bodies averaging in young cultures 0.15 to 0.30 μ in size, arranged singly or in short chains or masses. Third generation cultures from human tissues, and cultures in the fifth generation from the tissues of experimentally infected monkeys, were found to produce typical acute anterior poliomyelitis in experimental animals.

At the present time, therefore, we are in the possession of a good deal of positive knowledge with regard to the pathogenesis and epidemiology of infantile paralysis. The virus producing the disease has been isolated, cultivated and employed for the transmission of the disease to experimental animals in investigations that have proved invaluable and indispensable for the increase of our knowledge of its spread among human beings. The virus has been found in the naso-pharynx of human carriers of the disorder, who though they have never apparently suffered from it

themselves, yet are capable of transmitting it to others. The virus has also been found in the alimentary tract of patients and experimental animals with infantile paralysis, a fact which may explain why it is that a gastro-intestinal upset sometimes precedes and appears to be the cause of an attack of infantile paralysis. The virus has been proved to reach the patient's central nervous system, in which its main pathological action is exerted, by travelling along peripheral nerves—the sciatic, the nasal nerves, the optic nerves and tracts, for example—to the spinal cord or brain as the case may be, and this is to be regarded as the normal mode of infection in poliomyelitis; gross infection of the blood stream with the virus may also suffice to infect the brain. Evidence has been adduced to show that certain flies, particularly *Stomoxys calcitrans,* the common stable fly, may act as carriers of the disease. In addition the virus has been found on clothes, handkerchiefs and toys used by patients in the acute stages of infantile paralysis. The careful examination of washings from the mouth or intestine have shown that human beings may remain carriers of the virus for as long as six months. According to Kling, quarantine for infantile paralysis should last at least a fortnight—in New York it now lasts for ten days or thereabouts, we are told—though it is clear that no certainty attaches to any fixed period in this connection. There is reason to believe that the great majority of adults and many children may be infected with the virus without being a penny the worse for it, either because the virus is enfeebled or because the resistance of such individuals is high. Thus it is probable that every patient actually ill with the disease has in his immediate environment a number of mild and abortive cases of infantile paralysis that escape observation or detection and diagnosis, and also a still larger number of perfectly healthy people who are all carriers of the infecting agent and therefore potential sources of infection to others. It would seem as if all these persons developed a relatively high degree of immunity to the virus, a fact which may explain the comparative immunity of European towns or villages visited by epidemics of infantile paralysis to the occurrence of further epidemics during the next few years. In fact, as with cerebrospinal meningitis, the number of the carriers of the infection may be much larger in infantile paralysis than the number of the victims of an epidemic of that disease.—*The British Medical Journal.*

NOTES ON METEOROLOGY AND CLIMATOLOGY

THUNDERSTORMS OF THE UNITED STATES

A THOROUGH study of the distribution of thunderstorms has been made by Mr. W. H. Alexander with the aid of the officials in charge of more than one hundred of the regular weather bureau stations.[1] Following this, Professor R. DeC. Ward has fittingly brought out the significance of the thunderstorm as a climatic phenomenon.[2]

Thunderstorms are produced (1) by the excessive heating of the lower air; (2) by the over- and under-running of winds of different temperatures, which in some way cause moist air masses to rise rapidly; and (3) by the cooling of the upper air. These causes usually are not individually responsible for any thunderstorm; but act in conjunction.[3] Excessive heating of the lower air occurs in summer and most favorably on plains, plateaus and intermont basins. Thus in the United States the maximum number of thunderstorms is to be expected in the Mississippi Valley, and in the western mountain and plateau region. Furthermore, most come in summer: in 126 of 139 stations considered[4] the month with most thunderstorms is June, July or August. Cyclonic activity in a region subject to marked temperature changes is usually responsible for the production of thunderstorms by over-run-

[1] *Mo. Weather Rev.*, July, 1915, pp. 324–340; 13 maps.

[2] Pan-American Scientific Congress; abstract in *Mo. Weather Rev.*, December, 1915, p. 612.

[3] A comprehensive investigation of the physics of the thunderstorm was published in 1914 by Professor W. J. Humphreys. See review in SCIENCE, December 4, 1914, p. 823.

[4] H. Lyman, "Percentage Frequency of Thunderstorms in the United States," *Mo. Weather Rev.*, December, 1915, pp. 619–620.